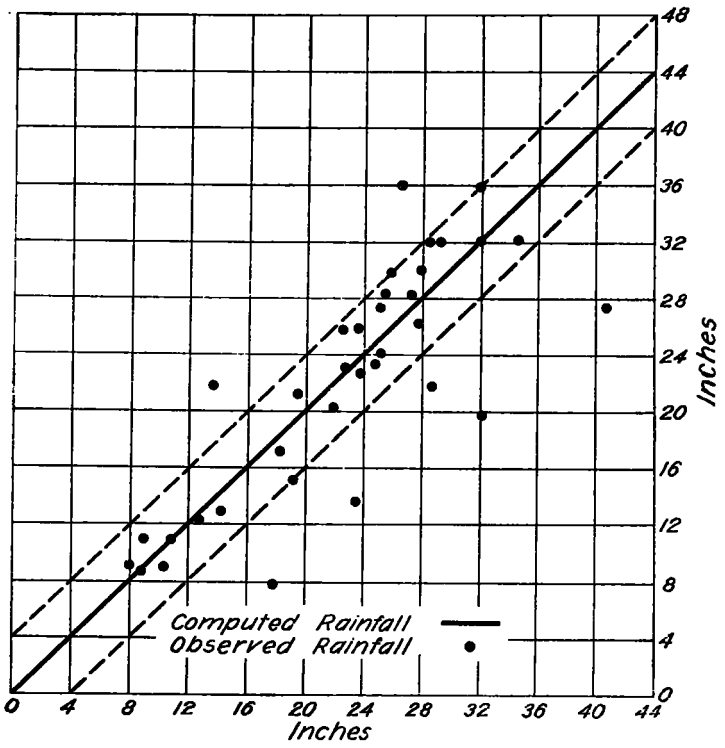

FIG. 9.—Relation of computed to observed rainfall, all groups

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A STUDY OF SEASONAL FORECASTING FOR CALIFORNIA BASED ON AN ANALYSIS OF PAST RAINY SEASONS

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SYNOPSIS

A study in seasonal forecasting is here outlined on the theory that conditions are forming over the Pacific Ocean before the rainy season begins, and also during the opening months, that will, when interpreted, indicate the character of the ensuing rainfall season with a high average of probability.

I have investigated the last 40 seasons (ending 1924–25) for pressure, and for rainfall as far back as records are available. I have ascertained that when low-pressure areas enter directly the central to southern California coast in September or October, there is a ten-to-one probability that the ensuing season (for central and southern California) will be an average to wet one.

I have also collected data to show that in the seasons in which San Diego has above average summer rains (July, August, or September) the ensuing rainy season will likewise be average to wet, with a 90 per cent probability.

The forecast values of appreciable rains in November as far south as Santa Barbara is also considered.

The rainfall for the same seasons in northern, central, and southern California are sometimes proportionately alike while in other seasons they are radically different. Of the seasons in which there are no early movements of LOWS or no summer rains at San Diego, some are still average to wet ones, but all the dry or partly dry seasons follow such rainless summers.

The present status of seasonal forecasting.—The investigation of seasonal forecasting of rainfall for California has until recent years been handicapped by lack of sufficient data. Weather Bureau records for the continental area are abundant, but it is only since 1922 that we have been able to form much idea of conditions over the Pacific through radio reports. Thanks to the success of the San Francisco office of the Weather Bureau in enlisting the cooperation of steamship companies, data from the oceanic area are now being received which will enable us gradually to improve the basis of our attempts at seasonal forecasting for California. This is a subject which, owing to its economic importance, is well worth all the attention any investigator can give to it.

Though seasonal forecasting is a baffling subject, it is not hopeless. The Indian meteorologists have for many years studied the movements and intensities of the monsoons as affecting and forecasting the rainfall of India a few months in advance, and their efforts have met with considerable success. For southern California, McEwen has investigated the relation between the water temperatures off the coast in summer and the rainfall of the following rainy season. His method has so far produced very encouraging results. But we are still in the pioneer stage of long-range forecasting, and conclusions must be accepted tentatively and held open to revision as data accumulates.

Three divisions of the State for rainfall.—This State is so generally considered as northern and southern California that meteorologists have fallen into the same habit. I believe, however, that it is much more accurate to divide it into three sections, northern, central, and southern. Even this demarcation is somewhat vague; however, as nearly as seemed practicable, I have drawn the lines of division as follows: A line from northern Marin County to the city of Marysville would divide the northern from the central section, and a line from the coast at Monterey across to Merced would mark the division between central and southern California. Our main discussion will relate to the central and southern California sections. The dry region everywhere east of the Sierra is climatically always in a separate class.

In referring to rainy seasons they are always understood on the Pacific coast to begin with July 1 and to end with June 30. East of the Rockies the season agrees with the calendar year. As to the kinds of rainy seasons, I divide them into four types and consider that any further division would be impracticable. It becomes